EasyScan Specifications Sheet

Optical engine	Confocal SLO
Capture mode	Green, near infrared and combined (pseudo color)
Field of view	45°
Pupil size	>1.5 mm.
Auto focus and auto capture	Yes
Alignment help	"See what you get" with IR live imaging
Networking capabilities/Tele diagnosis	Yes
Image formats	TIFF, BMP, DICOM, PDF, JPEG, PNG
Weight	10 kg

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PRODUCT FEATURES

No need for dilation or darkened rooms
Imaging though pupils as small as 1.5mm

Compact and portable
The EasyScan fits on every desk, anywhere

Real-time view of retina, enhanced periphery
Autofocus, auto capture, auto exposure.

Easy to use
Joystick navigation and intuitive user software.

Different capture modes
Green and near IR for three imaging modalities

High-contrast imaging and resolution:
see up to the sixth bifurcation (see from 10µm)

EasyConnect
For easy sharing, reviewing, archiving and reporting

Library of documents (videos and PDFs)
Accessible directly from within the interface

Built-in library of documents facilitating the customers'
understanding and interaction

User and customer-friendly interface
Examinations results that are easy to understand and interpret

Retina report to go:
Engaging and customizable report that can be send to the customers' phones so they easily memorize the results of the eye exam

EasyScan Academy:
Courses presented in the form of modules (videos, PDFs, etc) providing clinical and practical training. Topics range from using the device to interpreting the results and furthering your medical knowledge.

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No dialiation.

The challenge in making a high quality image of the retina lies in the fact that it is difficult to get sufficient light through the pupil while at the same time collecting back the light again through the same small opening. It can be compared to looking through a key hole in a dark room while at the same time using a flash light to illuminate the room. This is even further complicated by the fact that the retina only reflects a small part of the light, most is absorbed since that is used to create vision. Finally, any disturbance in the cornia or lens (cataract) will result in scattered light reducing the contrast of the retinal image.

Fig.A: Illumination areas classic fundus camera (left) Vs. EasyScan (right)

In a classical fundus cameras the illumination is done by a doughnut shaped beam via the outside of the pupil and the reflected light is collected through the center of the pupil (See image above).

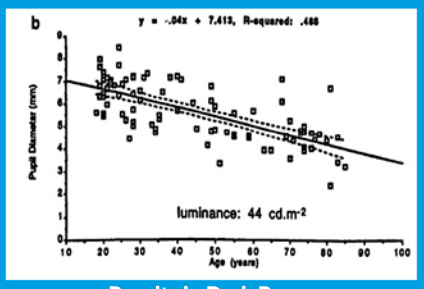
The optical design limits the minimum pupil size where there is still light going into the pupil and even before this minimum size is reached the amount of light and thus the brightness of the images is reduced.

The optical design of the EasyScan is such that the light is scanned through the pupil the top part of the pupil is used to illuminate the retina. The reflected light is collected through the bottom of the retina. This allows imaging through pupils as small as 1.5mm with acceptable image quality. In practice the challenge in imaging such small pupils is mainly the skill of the operator as well as the compliance of the person being imaged. Keeping the eye still enough to allow good alignment will be a challenge.

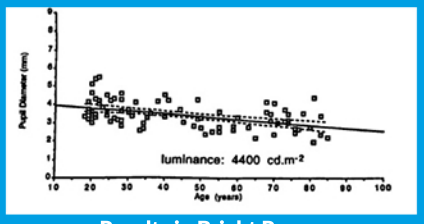
What pupil sizes to expect

Pupil sizes vary from person to person and depend strongly on age and ambient light conditions. These experiments show the pupil size of volunteers under different lighting conditions. It can be seen that as the subjects become older the pupil size decreased. In particular in bright rooms a large fraction of people over 50 have a pupil that is smaller than 3 mm. Even moving imaging a dark room will not solve the problem since after the first image of is taken the pupil will quickly reduce in size resulting in problems with the 2nd image. See below where the smallest and largest pupil size for individual subjects was measured while 4 images (2 per eye) where taken in about 3 minutes made to collect a complete set of images.

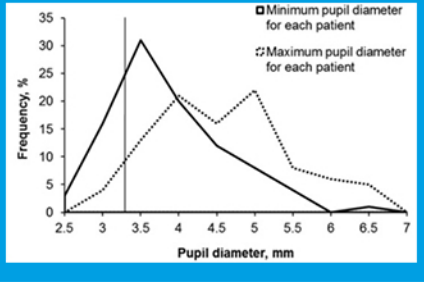
This is again even more problematic for older people since their accommodation response is slowed down, thus requiring more time in a darkened room before starting the examination and between images. Resulting in longer examination times.



Results in Dark Room



Results in Bright Room



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Stunning Quality Imaging

The EasyScan uses two lasers with different wavelengths selected to provide maximum information at different levels of the retina. When combined with the confocal optical design that reduces the impact of stray light coming from the lens and the viscous body, it results in sharp and high contrast images.

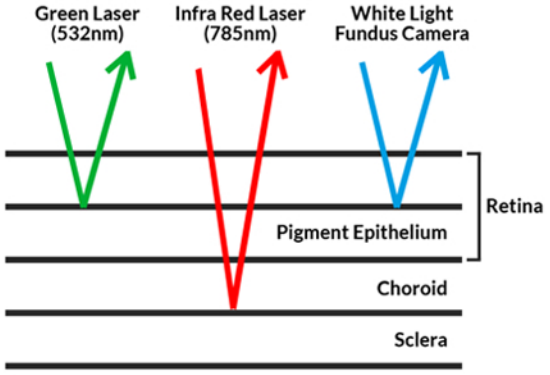

Figure B: Lasers Comparison

The green (520 nm) laser is tuned for maximum contrast of the blood vesels in the top layer of the retina. The combination of the high contrast and optical resolution (~15□m) allows the clear visualization of the smallest (6th bifurcation) blood vessels near the macula. See figure. The images also show the white bands of the nerve fiber bundels leaving the optical nerve head. The cicular bright rings near the center of the image are the reflections from the internal limiting membrame and are normal for younger eyes.

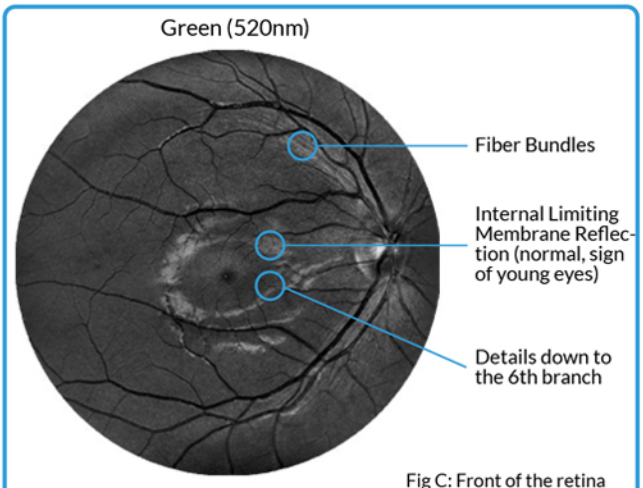

Fig C: Front of the retina

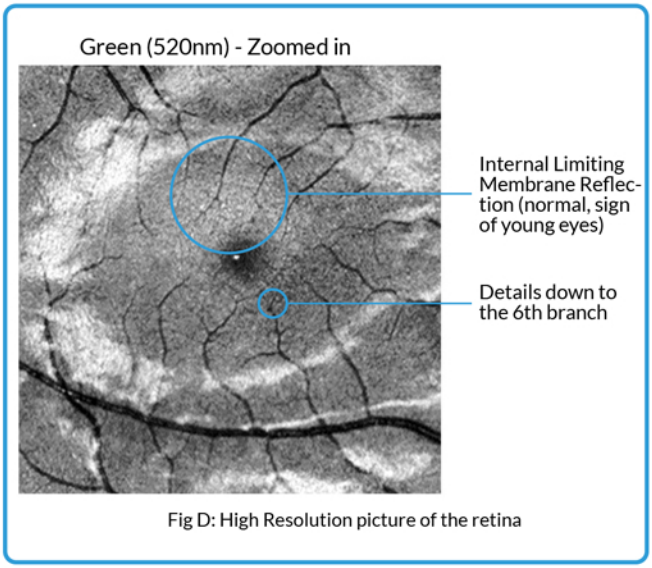

Fig D: High Resolution picture of the retina

The Infrared laser (780nm) penetrates deeper into the retina and reflects mainly from the Retinal pigment epithelium (RPE) layer. These images revial what remains initially hidden in normal white light fundus images, the early changes in the RPE layer that could later on develop into AMD.

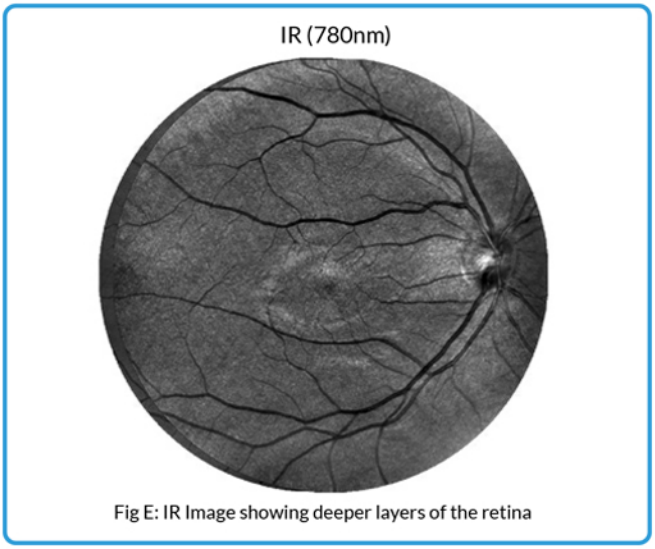

Fig E: IR Image showing deeper layers of the retina

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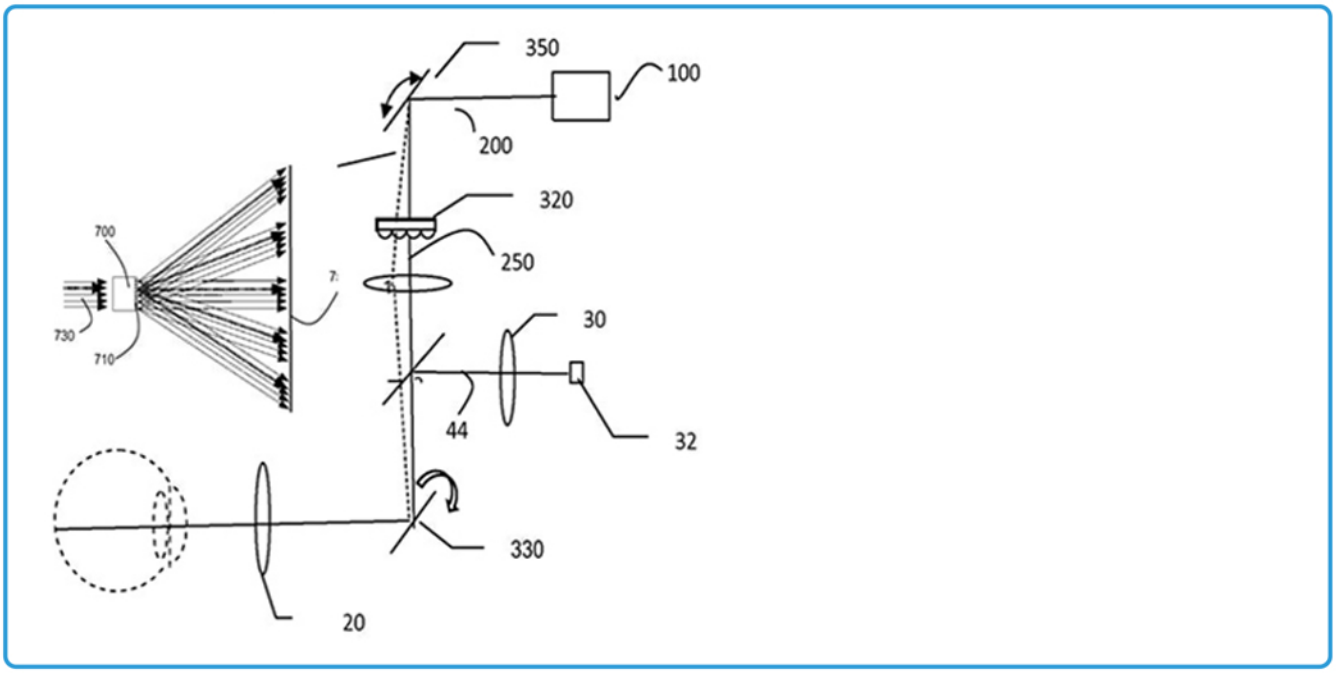
Fast Imaging

The EasyScan uses a unique and patented multi spot technique. Classical Scanning Laser Opthalmoscopes (Heidelberg, OPTOS, NIDEK) all use a single spot to scan the retina. To build up an image a small (~15µm) spot is quickly scanned in two directions. The benefit is that it allows a "classical" confocal system where a circular pinhole is placed in front of the detector to reject light not reflected by the layer that the incoming light is focused on. This results in high contrast images but does require very fast scanning of the spot to keep the total imaging time manageable. Typically, the maximum frame rate (at full FOV and full resolution) is limited to around 2 frames per second. Any move ment of the eyes during the taking of the image will result in distortions in the image that potentially could be misinterpreted as for example excessive tortuosity of the vessels.

The EasyScan overcomes this limitation in frame rate by employing a unique multi spot technique. The laser beam is split into hunderds of spots in a line.

The reflected light is imaged on a line sensor therefor allowing the images to be build up quickly line by line instead of point by point. This result in a frame rate of 9 frames per second. This is used to build up a live image with the IR laser. Since this light is nearly invisible to the eye it can be used to align the system without the subject being blinded. When the alignment is ideal and the subject has opened eyes fully the operator can select to capture the green image. The last few IR frames before the green image was taken are used to build up not only the IR image but also recorded as a short movie. This movie is unique since it allows the visualition of floaters. A common problem for people where small flecks of a protein called collagen are floating through the visual field. The EasyScan is one of the few devices that allows this to be visualized and shown to your customers to explain what they are experiencing. **Watch the movie here**



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Easy to connect

The EasyScan Camera is controlled with the EasyScan Capture SW. This SW runs under windows (8.1 or 10) and most modern PC will be sufficient to run the SW (See min spec below). Since the SW runs on a normal PC it is easy to integrate the EasyScan in your workflow. With a growing list of providers that provide SW for optical retail to manage customers databases, appointments and/or orders, EasyScan comes with an interface allowing customer data to be shared.

Fig. X: List of current CRMs supported by the EasyScan Software
Please contact us to set up interface to SW if not yet in list)

With this interface in place it is possible to select a customer in your CRM SW and from there directly launch the EasyScan SW. This will allow you to immediately start taking images without having to re-enter the customer information. After you have finished the exam, the SW automatically exports the images for further collection or sharing with your CRM SW (*the level of integrity varying between SW providers). The images collected with the EasyScan can be easily exported and shared through email with your customers (*requires installation of an email client on your pc)

Easy to Share

After the exam you can use the integrated movies to explain to customers what was done and why it is important to protect their retina. You can then provide customers with a customizable handout (Retina Report to go with your own logo and address) showing their own retina.

Easy to Use

The EasyScan is designed to allow you to confidently take excellent images. Customer data can be entered with normal keyboard and mouse allowing fast, accurate and easy data entry compared to on-screen displays. Once the exam is started, a large screen shows a live view of the retina providing you with immediate feedback on your alignement.

During the complete exam you don't need to interact with the on screen SW at all anymore. The complete device is controlled with the joystick along with two knobs. This allows you to keep your hands on the device at all times. The EasyScan has automated the following functions:

- Auto exposure: The system automatically adjusts gain of the detector to have always a consistent brightness, no need to adjust the light or exposure levels. Allways have a consistent image brightness.
- Auto focus: With one push of a button (see picture) the system will automatically find the optimal focus position
- Auto Eye field detection: If you switch over from left to right eye the system automatically detects this and ensures that images are stored with the correct label
- Change internal fixation on the systems.

With one push of a button, the internal fixation led can be switched from central to nasal. We have made the conscious choice not to implement auto alignment because we believe that this is the part that allows you to look professional. Alignment is facilitated by the pupil cameras showing the overview and the alignment indicator

Furthermore, auto-alignment often fails with older customers who have trouble keeping their eyes still and properly fixated on the fixation target. With the manual alignment we provide it is easier to guide and instruct the customer as well as selecting the correct moment to take the picture.

PC Specifications

Processor:	5th generation or newer Intel I5 or I7 processor
Graphics Cards:	Graphics NVIDIA or (integrated) Intel Graphics)
RAM:	≥ 4GB
Hard Disk Space:	≥ 250GB
Input Devices:	Default mouse and keyboard compatible with PC HW and OS
Operating System:	Win 8.1 or 10
Screen Size:	15 inch or larger
Screen resolution:	At least 1366 x 768 pixels - 4K/Retina Displays not recommended
Interfaces:	At least 1 free USB port, we recommend not to use other ports in parrallel